# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

## JNANASANGAMA, BELAGAVI-590018

**An Internship Report**

# "TECHNICAL MAINTENANCE OF TOYOTA VEHICLES"

**Submitted in partial fulfillment for the award of degree of**
**Bachelor of Engineering**
**In**
**Mechanical Engineering**
**Submitted by**


**DARSHAN GOWDA K M**

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**Internship Carried Out at**

**Nandi Toyota, Thallgatapura,**

**Bangalore-560109.**


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## DEPARTMENT OF MECHANICAL ENGINEERING

## K S SCHOOL OF ENGINEERING AND MANAGEMENT

**# 15, Mallasandra, Off. Kanakapura Road,**
**Bengaluru-560109**


**2020-21**

# K S SCHOOL OF ENGINEERING AND MANAGEMENT

## Bengaluru-560109

## Dept. of Mechanical Engineering

## CERTIFICATE

This is to certify that the internship work entitled **"TECHNICAL MAINTENANCE OF TOYOTA VEHICLES"** is a bonafide work carried out by

**DARSHAN GOWDA K M** **1KG17ME011**

In partial fulfillment for the award of **Bachelor of Engineering** in **Mechanical Engineering** of the **Visvesvaraya Technological University, Belagavi** during the year **2020-21**. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The internship report has been approved as it satisfies the academic requirements in respect of internship work prescribed for the said Degree.

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1.

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## DECLARATION

I, Student of Mechanical Engineering, K. S. School of Engineering and Management, hereby declare that the internship report entitled "**TECHNICAL MAINTENANCE OF TOYOTA VEHICLES**" embodies the record of the internship carried out at **company/organization name** under the guidance of **Prof. Dr. P. N. Jyothi,** and **Mr. Deepak**, for the fulfilment of the requirement of the award of the Degree of Bachelor of Engineering.

DARSHAN GOWDA K M 1KG17ME011

Place: Bengaluru

Date:

# ACKNOWLEDGEMENT

The successful completion of any task would be incomplete without the mention of the people, whose constant guidance and encouragement crowned our efforts with success. We consider it as a privilege to express our gratitude and respect to all those who guided us in the successful completion of this project.

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We express our gratitude to **Dr. Balaji B**, Professor and HOD, Department of Mechanical Engineering, K. S. School of Engineering and Management for providing valuable insights, making the resources available at right time and all the encouragement for the completion of my project.

We owe our profound gratitude to our internship guide **Dr. P. N. Jyothi & Mr. Deepak** who took keen interest in the work and guided all along and for providing all the necessary information.

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# INTRODUCTION

## 1.1 INTRODUCTION ABOUT THE COMPANY

The Toyota Motor Corporation is a leading global enterprise, generating the eleventh largest revenues in the globe, and representing the third largest automobile manufacturer in the world, after General Motors and the German group Volkswagen (Crown Motors). Toyota is nowadays a leading retailer throughout the world, especially within the United States, and this leading position has been attained due to the company's increased ability to understand the needs of the market and adapt to them. Throughout this project then, the emphasis would be placed on the identification of the various opportunities and threats, as these emerge from the external environment and impact Toyota. These threats and opportunities would be presented, as well as assessed based on the company's ability to respond to them. The initial hypothesis is that the company is sufficiently skilled and capable to adequately address these threats and opportunities.

The world's top ten automotive companies, Japan's biggest car company, was founded in 1933, and now has developed into the main car production; business to large industrial groups involved in machinery, electronics, finance and other industries.

Toyota's early manufacturing of textile machinery, textile machinery production, founder Kiichiro Toyoda in 1933 established the Automotive Division, and thus began the history of manufacturing cars of Toyota Motor Corporation. In 1935, Toyota AI cars a successful trial, the second year of the formal establishment of Automotive Industry Corporation. However, the slow development of the whole number of 30's and 40's, just after World War II, Toyota Motor Corporation to accelerate the pace of development. Through the introduction of European and American technology under the guidance of the U.S. automotive technical experts and management experts, and soon mastered the art of automobile production and management techniques, and in accordance with the characteristics of the Japanese nation, created the famous Toyota Production System management mode, and continue to be improve and perfect, greatly improving plant efficiency and product car at the end of the 1960s, the influx of the North American market. In 1972, the total production of 10 million.

The 1970s were the golden period of rapid development of the Toyota Motor Corporation from 1972 to 1976 was only four years due, the company produced 10 million cars, annual car reach over 200 million. The 1980s, Toyota Motor Corporation's production and sales are still straight up to the early 1990s, annual output of the car has exceeded 4 million to close to 5 million, beating the Ford Motor Company vehicle production ranked second in the world. Toyota Motor Corporation, the 1960s and 1970s Japan's self-growth period, after the 1980s, and began it fully into the world of international strategy. It worked in the United States, Britain and Southeast Asia to establish wholly-owned or joint ventures, and automotive research and development centre jointly built by the local implementation of the internationalization strategy of the local research and development of design and production.

Toyota Motor Corporation has a strong technical development capability, and attaches great importance to study customer demand for cars. Hit a different brand-name products and thus in different historical stages of its development, and rapid product changeovers to defeat the US-European competitors. Early Toyota, Crown, optical crown, Corolla car, a famous and recent Cressida lek Texas luxury car is also very prestigious. Toyota Motor Corporation headquartered in Tokyo, Japan, the incumbent president, Shoichiro Toyoda. An annual output of the car is nearly 5 million, and exports account for nearly 50%. Toyota Motor Corporation in partnership with South Korea's Hyundai Motor Company.

Periodic maintenance refers to activities performed on equipment based on a set time interval. The purpose of periodic maintenance, or time-based maintenance, is to maintain smooth operation of a machine or other asset. It could be done annually, quarterly, monthly, or weekly.

The easiest way to determine how often to update asset parts is to check the manufacturer’s guidelines. Wear and tear in equipment is unavoidable and assets would usually have a finite life span before eventually being retired from operations. In this service of the vehicles leads to increase the life of the parts and objects of the vehicles. Body and paint work can done in accident vehicles while claiming the insurance or while vehicles are given for services.

Chapter 2

# HISTORY OF TOYOTA COMPANY

Towards the end of the nineteenth century, Sakichi Toyoda invented Japan's first power loom, revolutionising the country's textile industry. January 1918 saw him create the Toyoda Spinning and Weaving Company, and with the help of his son, Kiichiro Toyoda, Sakichi fulfilled his lifelong dream of building an automatic loom in 1924. The establishment of Toyoda Automatic Loom Works followed in 1926. Kiichiro was also an innovator, and visits he made to Europe and the USA in the 1920s introduced him to the automotive industry. With the £100,000 that Sakichi Toyoda received for selling the patent rights of his automatic loom, Kiichiro laid the foundations of Toyota Motor Corporation, which was established in 1937. One of the greatest legacies left by Kiichiro Toyoda, apart from TMC itself, is the Toyota Production System. Kiichiro's "just- in-time" philosophy - producing only precise quantities of already ordered items with the absolute minimum of waste - was a key factor in the system's development. Progressively, the Toyota Production System began to be adopted by the automotive industry across the world.

Rising from the ashes of industrial upheaval in post-war Japan, Toyota has become the largest vehicle manufacturer in Japan with over 40% market share. Toyota began to make inroads into foreign markets in the late 1950s. The first Crown models arrived in the USA in 1957, and by 1965, with models such as the Corolla, Toyota began to build its reputation and sales to rival those of domestic producers. The first Toyota imported into Europe was via Denmark in 1963. Toyota has continued to grow in Europe's sophisticated and complex market, and in 2000 the company delivered its ten millionth cars to a customer in Germany. In fact, growth is currently one of the main words in Toyota's European vocabulary, and the company plans to reach annual sales of 800,000 in Europe by 2005. Toyota is number one for customer satisfaction in the majority of European countries and has built an excellent reputation across Europe for reliability and customer service. This enviable reputation, along with the support of a network of more than 25 distributors and 3,500 sales outlets, are important factors in supporting Toyota’s European sales growth in the coming years.

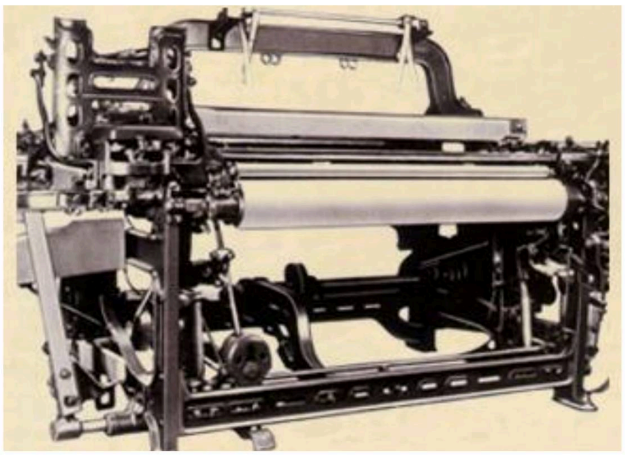


**Figure 1.21 Toyota Automation Loom**

**Figure 1.22 Toyota Corolla**

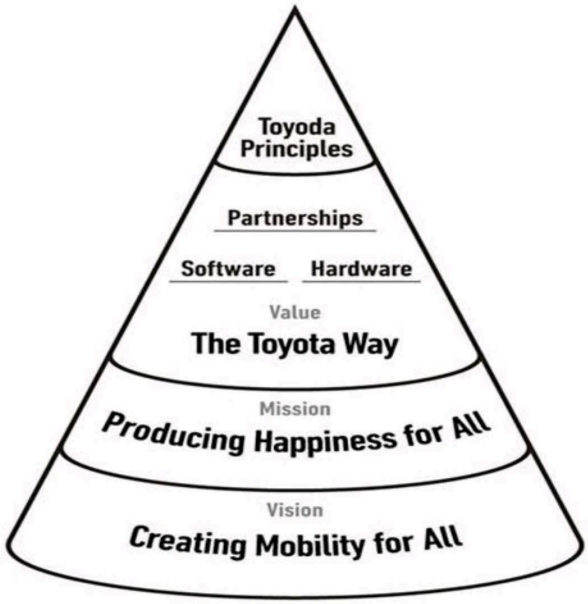



**Figure 1.23** Toyota Philosophies

Toyoda Principles: Five Main Principles of Founder Sakichi Toyoda

1. Always be faithful to your duties, thereby contributing to the company and to the overall good.
2. Always be studious and creative, striving to stay ahead of the times.

3. Always be practical and avoid superficiality.
4. Always strive to build a homelike atmosphere at work that is warm and friendly.
5. Always have respect for spiritual matters, and remember to be grateful at all times.

Seventy-eight years ago, Kiichiro Toyoda has founded Toyota Motor Corporation and the automotive manufacturer has become one of the powerful manufacturer companies around the world. In the motor industry, Toyota has made into 100 “Most Admired” list of companies in the world on the Fortune Magazine in 2016 (Szczesny, 2016). The popularity reflects the company’s mission and vision statement, which has emphasized a comprehensive approach that considers innovation and customers’ needs.

Toyota Motor Corporation is a Japan-based company mainly engaged in the automobile business and financial business. The Company operates through three business segments. The Automobile segment is engaged in the design, manufacture and sale of car products including passenger cars, minivans and trucks, as well as the related parts and accessories. The Finance segment is involved in the provision of financial services related to the sale of the Company's products.

The company was as a spinoff of Toyota Industries, a machine maker started by Sakichi Toyoda, Kiichiro's father. Both companies are now part of the Toyota Group, one of the largest conglomerates in the world. While still a department of Toyota Industries, the company developed its first product, the Type A engine in 1934 and its first passenger car in 1936, the Toyota AA.

After World War II, Toyota benefited from Japan's alliance with the United States to learn from American automakers and other companies, which would give rise to The Toyota Way (a management philosophy) and the Toyota Production System (a lean manufacturing practice) that would transform the small company into a leader in the industry and would be the subject of many academic studies.

In the 1960s, Toyota took advantage of a rapidly growing Japanese economy to sell cars to a growing middle-class, leading to the development of the Toyota Corolla, which would go on to become the world’s all-time best-selling automobile. The booming economy also funded an international expansion that would allow Toyota to grow into one of the largest automakers in the world, the largest company in Japan and the ninth-largest company in the world by revenue, as of December 2020. Toyota was the world's first automobile manufacturer to produce more than 10 million vehicles per year, a record set in 2012, when it also reported the production of its 200 millionth vehicle.

Toyota was praised for being a leader in the development and sales of more fuel-efficient hybrid electric vehicles, starting with the introduction of the Toyota Prius in 1997. The company now sells more than 40 hybrid vehicle models around the world. However, more recently, the company has also been accused of green washing for its skepticism of all-electric vehicles and its focus on the development of hydrogen fuel cell vehicles, like the Toyota Mirai, a technology that is costlier and has fallen far behind electric batteries.

Toyota Motor Corporation produces vehicles under five brands: Daihatsu, Hino, Lexus, Ranz and the namesake Toyota. The company also holds a 20% stake in Subaru Corporation, a 5.1% stake in Mazda, a 4.9% stake in Suzuki, a 4.6% stake in Isuzu, a 3.8% stake in Yamaha Motor Corporation, and a 2.8% stake in Panasonic, as well as stakes in vehicle manufacturing joint ventures in China (GAC Toyota and FAW Toyota), the Czech Republic (TPCA), India (Toyota Kirloskar) and the United States (MTMUS). Toyota is listed on the London Stock Exchange, Nagoya Stock Exchange, and New York Stock Exchange and on the Tokyo Stock Exchange, where its stock is a component of the Nikkei 225 and TOPIX Core30 indices.

The Toyota Way is a set of principles and behaviours that underlie the Toyota Motor Corporation's managerial approach and production system. Toyota first summed up its philosophy, values, and manufacturing ideals in 2001, calling it "The Toyota Way 2001". It consists of principles in two key areas: continuous improvement and respect for people.

The Toyota Way has been designated "a framework intended to give the instruments to individuals to constantly improve their work". The 14 standards of The Toyota Way are coordinated in four segments:

1. Long haul reasoning
2. The correct cycle will deliver the correct outcomes
3. Enhance the association by building up your kin

Persistently tackling root issues drives authoritative learning

Chapter 3

# ABOUT DEPARTMENT

The Toyota Motor Corporation is a leading global enterprise, generating the eleventh largest revenues in the globe, and representing the third largest automobile manufacturer in the world, after General Motors and the German group Volkswagen (Crown Motors). Toyota is nowadays a leading retailer throughout the world, especially within the United States, and this leading position has been attained due to the company's increased ability to understand the needs of the market and adapt to them. Throughout this project then, the emphasis would be placed on the identification of the various opportunities and threats, as these emerge from the external environment and impact Toyota. These threats and opportunities would be presented, as well as assessed based on the company's ability to respond to them. The initial hypothesis is that the company is sufficiently skilled and capable to adequately address these threats and opportunities.

Toyota motor corporation is a Japan-based company mainly engaged in the automobile business and financial business. The Company operates through three business segments. The Automobile segment is engaged in the design, manufacture and sale of car products including passenger cars, minivans and trucks, as well as the related parts and accessories. The Finance segment is involved in the provision of financial services related to the sale of the Company's products, as well as the leasing of vehicles and equipment. The others segment is involved in the design, manufacture and sale of housings, as well as information and communication business.

Toyota Motor Company was selected, because of the tremendous growth the company sustained even through the automotive crisis in 2008 from 2010. Toyota Motor Corporation has strong technical development capabilities and attaches great importance to study customer demand for cars. Hit different brand name products and thus in different historical stages of its development, and rapid product changeovers to defeat the US-European competitors. This report provides research information obtained a stock option for investor’s, regarding the profitability, liquidity. Toyotas seem to know what’s going to happen from year to the next. Like a chest game, their strategies have been on point in preparing them to make the right move at the right time, with results of Toyota ends up on top. For an example; The Japanese automaker just combined their U.S operations to Plano, TX, where they not only moved their eleven manufacturing outlets and three distribution networks division, but their sales, marketing, and financing headquarters (Ferguson, 2015). Toyota Motor is constantly and never-ending improvement, with the effects of economic trends by a shift in new direction. However, Toyota Motor Company seeks the opportunity to grow its business in the United States. PESTEL/PESTLE analysis measurement of Toyota’s the external economic influences created three opportunities for Toyota Motor Company growth; 1) Weaker Yen vs. U.S. Dollar, 2). Gradual growth of U.S. economy, 3). Rapid growth of developing countries, (Ferguson, 2015). For that reason, fast growth of emerging economies presents developed an opportunity for the organization to increase profits due to these markets (Ferguson, 2015). According to

Toyota website (2016) CSR Management, reported the company financial strategies are based three key priorities: growth, efficiency, and stability. The three priorities equally balance over the average to extended term will permit they accomplish stable and supportable growth and results into raise corporate value.

Profitability and liquidity are financial ratios. Financial ratios are one of the financial analysis tools. Financial analysis has been used to clarify the financial statements because the final accounts do not satisfy the investors anymore because of the increasing complicatedness and the huge expanding in the whole financial world. Profitability and liquidity measure a company's financial behaviour, how it will behave in the future and if the company will be able to survive in the market or to meet its obligations on the short term. In financial terms liquidity is all about showing how easily the company will pay its debt or will the company will be able to meet its obligations on the short term or not.

Toyota Motor Corporation was founded by Sakichi Toyoda in August 28, 1937 (Toyotaglobal.com, 2014) and their main business activities are motor vehicle production and sales (IBID). In 1981, Toyota decided to become a global corporation as it went into the global market

(Toyota-global.com, 2014) and has been ranked the 9th of the world's largest corporations in 2013. (World 's largest corporations, 2013) The company had earned over $18,198 million of profit in that year and has over 338,875 employees. (IBID) It is a multinational corporation and there are firms in America, Europe, Asia, Oceania and Africa. Toyota's mission in the U.S is "To attract and attain customers with high-value products and services and the most satisfying ownership experience in America". They've exceeded it and became the most respected car company in America. (IBID) Furthermore, Toyota aims to produce the best quality cars; employees of the company have the right to stop production if they think there is a quality issue.

(IBID) Their global mission is 'to deliver outstanding automotive products and services to the customers, and enrich our community, partners and environment'. Also, the president's goals are zero harm to the environment and zero quality defects. Toyota Motor Corporation (TMC) is a multinational company. It is the biggest manufacturer in motor vehicles within Japan. Its main offices are located in Japan, Toyota City. Toyota has several competitors namely Ford, Honda Motor, and Nissan Motor. TMC produces brands such as Allion, Camry, Premio, and Lexus among.

Toyota Motor Corporation Australia (Toyota, Australia) which deals with a wide range of car segments has manufactured the Prius Car in the automotive industry which is one of the best hybrid synergies drives in today business environment. And provide a competitive advantage to other business by achieving and environmentally friendly car and providing the best efficient fuel system. Toyota believes in 'kaizen' (continuous improvement). It has made a commitment to manufacturing, innovative technologies and social contribution that will enhance the quality of life. A better way of motoring has been developed using the Hybrid Synergy drive technology. It gives confidence to over 2 million drivers worldwide.

### 3.1 Toyota environmental challenges

The Toyota Environmental Challenge 2050 (Challenge 2050) is a set of six challenges three on reducing CO 2 emissions that cause climate change, one on conserving water, one on improving material flows, and one on protecting nature that seek to go beyond eliminating negative environmental impacts to creating net positive impacts on the planet and society.

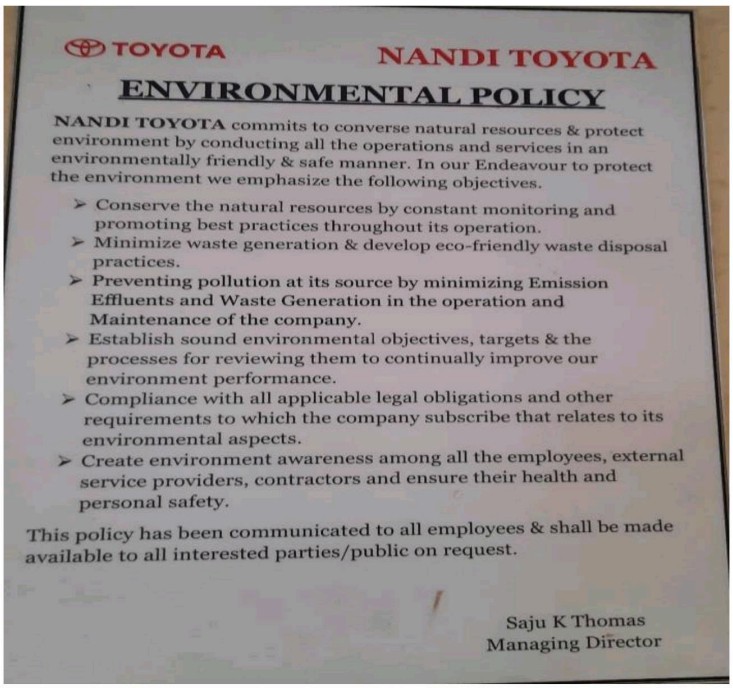



**Figure 3.1 Environmental policy in Nandi Toyota**

1. New vehicle zero co2 emission challenge.
2. Life cycle zero co2 emission challenge.
3. Plant zero co2 emission challenge.
4. Challenge of minimising and optimizing water usage.

As an intern with Nandi Toyota, I joined in the production and service department, where the central focusing is on the servicing and maintenance of vehicles and inspection of the Toyota vehicles, replacing parts, body and painting, service floor management, safety and precautions, company ideals, and sales and services.

1. The process of evaluation of the vehicles based on the models and the variants
2. The main requirements of the customers
3. The problems identified form inspection of the vehicles
4. Solution to the problems.
5. Advisors giving suggestion to the internal and external servicing, repairing and replacement of parts.

## 3.2 SAFETY PRECAUTION

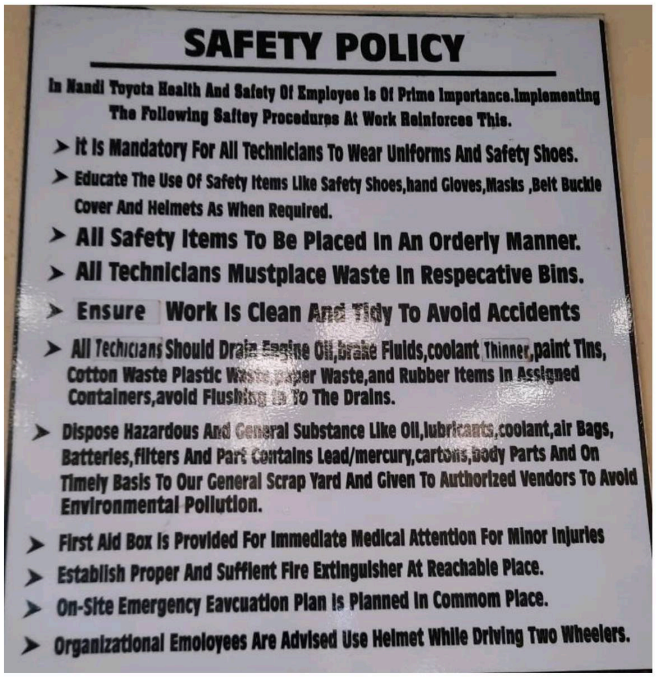



**Figure 3.21 Safety policies in Nandi Toyota**

1. Wear mask, gloves and safety shoes.
2. Wear safety glasses in body and paint.
3. Wear uniform on service bay.
4. Wear helmet while working under the vehicle.
5. Safe disposal of hazardous waste and materials.
6. Safe disposal of oil and hazardous liquids.
7. Waste treatment plant.
8. Maintaining water treatment plant.
9. Separation of different waste and maintaining clean environment.
10. Careful handling of customer vehicles.
11. Careful handling of tools.

## 3.3 PRINCIPLES

- Professional appearance.
- Careful vehicle handling and treatment.
- Neatness and cleanliness.
- Work safety.
- Planning and preparation.
- Speedy reliable work.
- Finish by promised time.
- Check work when finished.
- Keep old parts.

Chapter 4

# TASK PERFORMED

While working in the workshop I have seen and learnt about how a workshop running at full speed and achieve target as much faster as they can, so they meet the customer requirement and satisfaction.

There are four departments in workshop as follows:

1. Body shop

2. Painting shop

3. Service shop

4. Washing

## 4.1 BODY SHOP

In the body shop of Nandi Toyota those cars having some damage on its body are repaired. Dents, breaking of body parts, etc. are some common problems which come to the body shop.

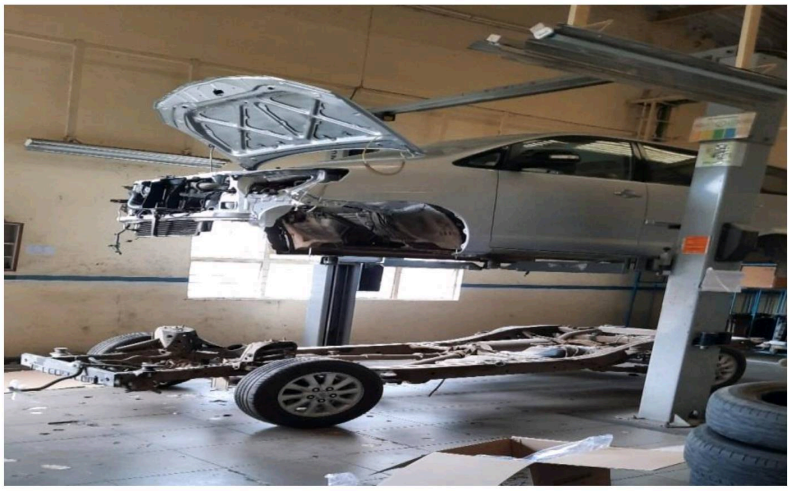


**Figure 4.11 Disassembling of Vehicle**

In a car mainly consists of two body i.e., Chassis body & Mono body which will be in top of the chassis as we can see in fig 4.11. Chassis frame is the basic frame work of the automobile. It supports all the parts of the automobile attached to it. It is made up of drop forged steel, carbon steel or aluminium alloy. And in Mono body all the parts related to automobile like powerplant, transmission, steering, suspension, braking system etc are attached to it.

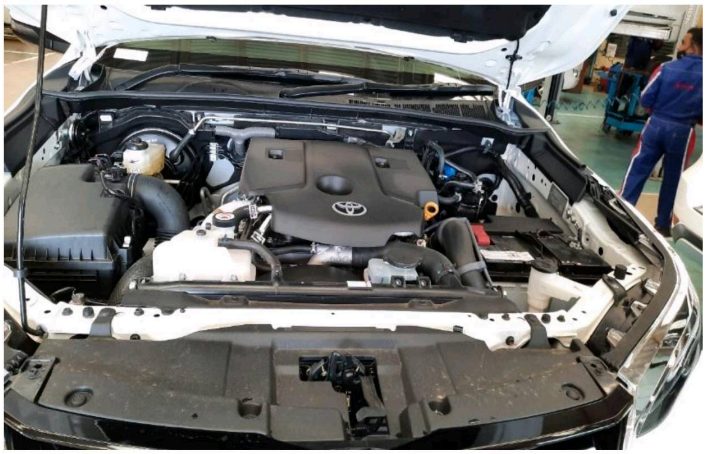


**Figure 4.12 Car hood of Petrol engine**

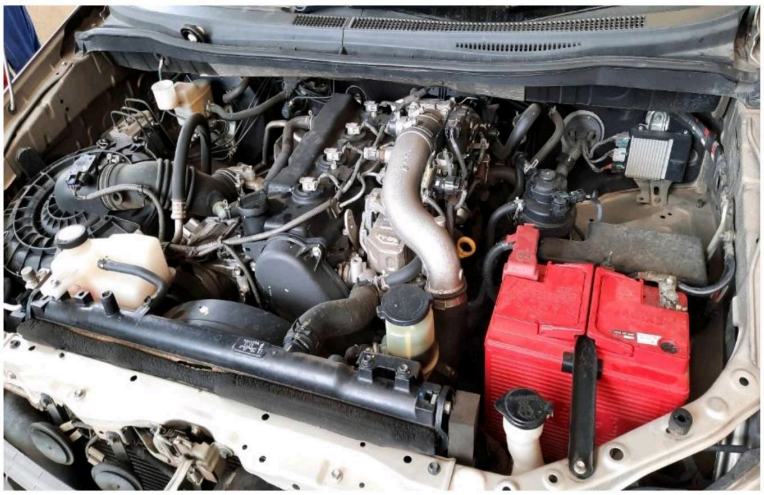


**Figure 4.13 Car hood of Diesel engine**

The car's hood consists of an inner and an outer panel. The inner panel provides strength, while the outer panel is just a metal cover. The underside of the hood is often covered with a sound-absorbing material. Car hood consists of Battery, Enginre, ECU, Air filter, coolant inlet & outlet, Brakes oil, spark plugs and Radiator.

**Figure 4.14 Dent part of vehicle**

Things like dents will be repaired in body shop as we can see in Fig and it can be repaired depending upon the extent of damage done on the metal work of the car exterior.

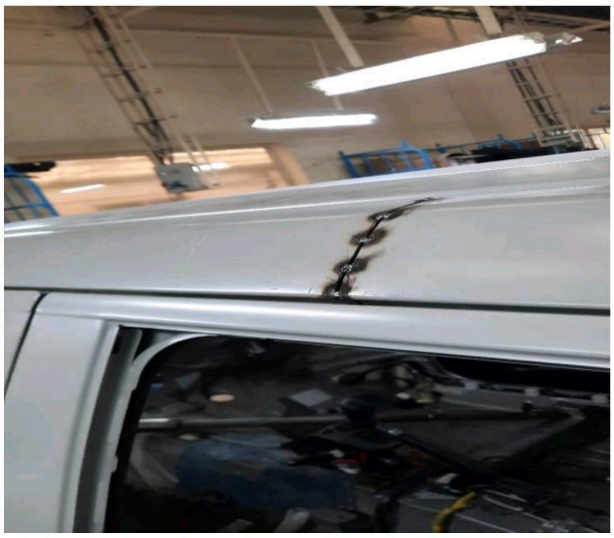


**Figure 4.15** Welding performed

The process of welding is also done in the Body shop as we can see in fig 4.15. if we need to join similar materials then this work will be used. Once after completing the body works, we need to get it back in colour by applying paint on it and that work will be performed under Paint shop.

### 4.2 Paint shop

Paint shop is the kind of parlour for cars, the aesthetic look of the cars are prepared here in this paint shop. Priming, painting, etc. are some processes perform in this shop.

**Figure 4.21 Paint Shop**

- The vehicle is bought in to the bay where body technicians inspect the accident areas and identifying the damaged parts. after identifying dents.
- After this they conclude weather to replace or repair the body part removed.
- If not possible to repair replacing of the part is done if repairable, they check the dent and mark it and sends the part to painting works.
- Painting works they clean the parts and check the dent areas then see the job card for any other issues.
- Apply yellow putty and red hardener for surface equality as we can see in FIG 4.21.
- Then wait for about 15-20 minutes then it is sanded with p80 grade paper.
- Then it is sanded with 120 grade paper.
- Then again with p180 and p220 grade paper. if plastic parts then add plastic primer for sticking of primer.
- For new parts rub with p220 grade paper.
- Use degrader for dust cleaning.
- Primer is applied on the sanded body part for even shape.
- After 30 minutes dulling the hardened surface with p320 grade paper.
- Apply white sealant for door, Bonnet, back door, to avoid water proofing then rub 500 grade paper.

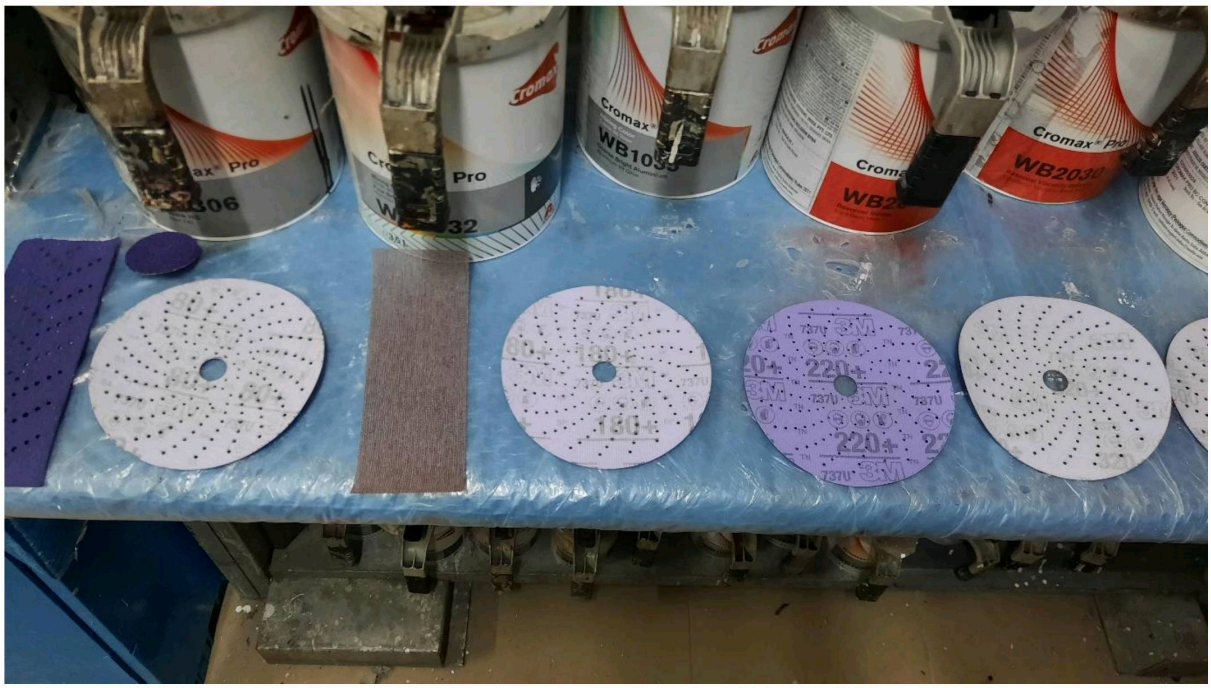



**Figure 4.22 Different sand papers used**

- Degrader is used to remove the dust and then the colour matching the vehicle is prepared and applied in the painting room as we can see in fig 4.22.
- Many formulas for matching the vehicle colour.
- After painting wait till it dry and the it is sent to body works and the body part
- After assembled and then finished and sent for polishing.
- Vehicle sent to delivery.

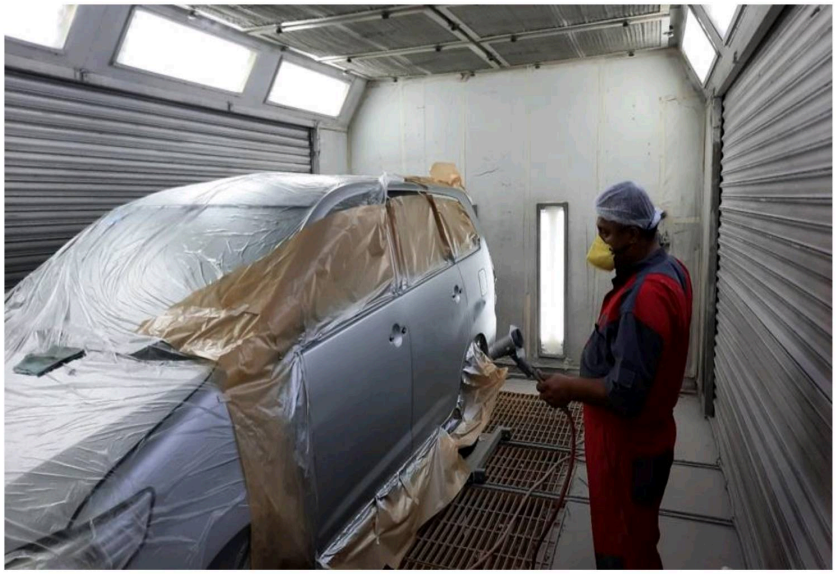


**Figure 4.23 Painting process**

**Figure 4.24 Spray painting process**

### 4.3 Service shop

In Service shop when vehicle enters the first gate the advisor reviews the vehicle history based on the maintenance done previously and collects the feedback of the customers and then sends to SA who inspects the vehicle for additional problems in the vehicle and quality of the vehicle after this the job card is created, it contains vehicle details and customer details and issues in the vehicle and service details, for the vehicle and a chip no is generated in service management board, this tracks where and what the vehicle is being handled .

- The job card is placed in the work board, and then it is taken by the technician for the further requirements.
- After inspection the vehicle is bought into service floor.
- The service bay contains LH technician, RH technician and inspector.
- The Inspector collects the job card and they operate under standard operating procedure

**Figure 4.31 Service Shop**

## Periodic maintenance of Toyota car

Periodic or time-based maintenance assumes that equipment failure can be predicted over time. It is a maintenance strategy that is applicable to equipment that has a foreseeable life span based on historical data or manufacturer specifications. Assets that are more prone to random failures are less likely to benefit from periodic maintenance.

1. This service is about the Toyota Innova model, it's a 10k service of diesel vehicle. First the service engineer collects the details from customer, if any problem in vehicle, noises and service of vehicle. This service is done about 25 to 30 minutes.
2. As mentioned in SOP the RH technician get details of vehicle from customer intelligence for bringing the vehicle. Totally 3 members for service of one vehicle, i.e., inspector, left hand technician (LH) and right-hand technician (RH).
3. The LH technician collects details from the CI and brings the parts for that service of vehicle. The vehicle bought to express maintenance bay and position the vehicle as per the lift position.
4. First check the all lights, indicators, front and rear wipers, music systems and noise in front and rear blower, interior lights. Then open the bonnets put fender cover and grill cover and check the steering rotation, brake fluids, and power steering fluids and A/C gas check in sight glass.
5. Inspector checks all the seat belt and dicky rear sets. Inspect the driver seat and brake pedal height.
6. Then refill the brake fluid, inspect drive belt, clean the air filter, remove the battery vent plug &inspect the specific gravity & water level. Refill wiper washer fluid.

Remove ac filter and clean the ac filter. Check the spare wheel if any changing of wheel. Then adjust the lift arms both side for lifting of vehicle.

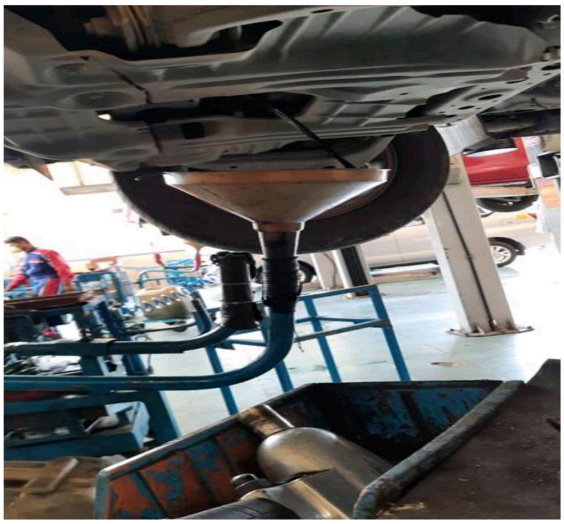


**Figure 4.32 Process of removing oil from engine**

1. To Inspect car to be lifted, then remove the all 4 wheels of car and check the balancing of wheels by inspector.
2. Remove the brake drum, clean the brake shoe & drum. Lubricate all recommended points and refix brake drum. Remove calliper, clean the brake pads, do lubrication & check brake disc thickness (mm).
3. Reinstalling the wheels and check the air pressure in wheel. Checking the bearing condition by inspector by turning the wheel.
4. Then loose the oil tank bolt and remove the oil from tank. Remove oil filter. Tight the bolt and install new oil filter. Down the lift and fill the oil and tight the cap.

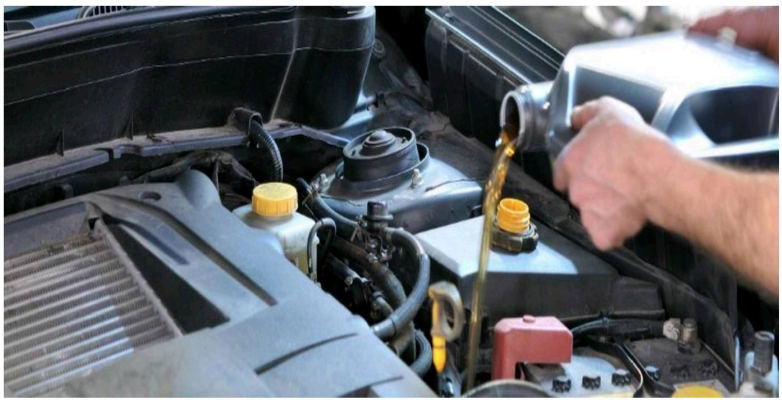
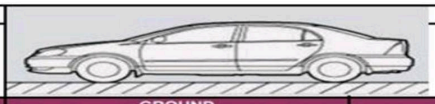
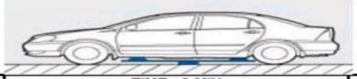
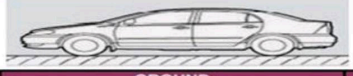


**Figure 4.33 Refilling of oil**

1. Switch on the engine, check any leakages are there. Put the parking brake do all wheel torque.
2. Then lift the vehicle again, check for the under-body inspection by inspector, suspension, steering and oil under body leakage. brake fuel pipe line, silencer and fuel tank inspection and propeller shaft lubrication etc.

3. If any other part changing is necessary updated in job card and vehicle is delivered. After the approval the vehicle sends to the general repair bay, for changing of tires, brake pads, suspension system, timing belt etc. related to engine repair all are doing by general repairers.
4. Wheel alignments can be done after the service if necessary. In wheel alignment, for front & rear wheels caster, camber and toe adjustments are done. And steering adjustments also done.
5. For every 10K oil service can be done,20K AC filter is change,30K air filter change and 40K differential oil change.

**Table 1 Operating Procedure in service area**

| | | |
|---|---|---|
| **LIFT POSITION** |  | |
| **GROUND** | **GROUND** | **GROUND** |
| **RH Technician** | **LH Technician** | **inspector** |
| Collects Vehicle Details from CI for Bringing the Vehicle | Collects Vehicle Details from CI &bring the parts | collects RO From Next Job Column of JPCB |
| vehicle brought to em bay | | |
| Position the vehicle as per the lift position | Guide the RH Technician during the vehicle | Guide to RH technician |
| Operate the front&rear all lights,operate front&rearwipers,musicsystem, check ac cooling,frnt&rearblower noise,front&rear acknobs,interior all lights | Check the headlamp, turn signal, parking light, wiper operation and wiper spray.if required correct wiper spary | check rear all light,rear wiper&sparycondition |
| pedal noise,gear leaver inspecte | if required correct wiper spary | |
| Release the Bonnet lever, fuel tank lever and check the steering rotation | open the bonnet put fender cover&grillcover,checks the Power steering Fluid,A/C GAS Check in Sight glass. | Dicky open &dicky shock inspect tool kit &rearseat,seat belt inspection |
| inspect driverseat operation | | |
| inspect brake pedal height | | |
| refill the brake fluid | remoove the battery vent plug& inspect specificgravity&water leavel | Remove the spare wheel, Check tyre&discCondition checkTyre Pressure |
| inspecte drive belt | refill wiper fluid washer | stepney tyre do wheel balancing |
| clean the air filter | Remoove ac filter& clean the ac filter | |
| inspecterh side both seat belt ,power window seat operation &do door lubrication | LH side bothseat,seat belt,power window operation inspected&do door lubrication | finish the wheel balancing stepney tyre aline the front lh wheel side |
| RH side lift legs aline the rh side | LHside lift legs aline the lh side | INSPECT RO |
| Operate lift | | |
| STOP the lift&release the Parking Brake and Check Liftlegs | inspect lift legs | |
| | TIME : 5 MIN | |
| remoove the caliper,clean the brake pads&do lubricate&check brake disc thickness(use micro meter) | lubricte all recommended points& refix the drum | inspecte front RH brake pad thickness |
| refix the brake pads&caliper remoove the hub nut do wheel instalation | do wheel instalation | put recommended torque for front rh caliper bolt |
| trolly aline the correct position | trolly aline the correct position | |
| down the lift | | fill the RO |
| | **TIME : 15 MIN** | |
| |  | |
| | **TIME : 3 MIN** | |
| **LOW LEVEL** | **LOW LEVEL** | **LOW LEVEL** |
| check engine oil level | fix stepney tyre | PUT THE parking brake |
| | | do all wheel torque |
| switch on the engine | | |
| operate the lift | | |
| |  | |
| | **TIME : 2 MIN** | |
| **HIGH** | **HIGH** | **HIGH** |
| under body inspection | under body inspection | under body inspection |
| suspension,steering,engine under side any leakage inspection | brake&fuel pipe line,silencer,fuel tank inspection | propeller shaft lubrication |
| operate the lift | | |
| |  | |
| **GROUND** | **GROUND** | **GROUND** |
| Remove RH lift arms | removeLH fendercover &grillcover | repair order update |
| remoove RH fender cover | remoove LH lift arms | |
| Drives the vehicle out of the Bay | | |

## GENEREAL REPAIR MAINTAINANCE

In GR maintenance there is no standard procedure but vehicle should get repair in the given time, regularly old vehicles will come under this maintenance because of lot of problems in vehicle. When a car enters the workshop, firstly they made a repair as per the customer requirements, or it may be its general repairs. Then the service adviser inspect the car and he told the technician what he finds at first stage then the technician fully examines the whole car & each n every part of the car and then he noted down in the job cards. Generally, the company provide 4 free general services, in which the mechanic or technician checks the engine oil, lubricating oil, water, air filter, A/C filter and other electronic controls. And if he detects any problem which might reduce the car efficiency, he will notify to the service advisor and then service advisor calls to the customer and tell him about the defects and then if the customer is ready to repair it then the service adviser tells to the mechanic and then mechanic repair the problem so the car run effortlessly. Defected cars are selected on the basis of their faults and then send to it their specified category of shop such as if any car having damage related to tits body, then it sends to the body shop or if any engine, brake, wheel alignment then it sends to the service shop.

## BRAKES SYSTEM

Brakes reduces a vehicles speed and brings it to a stop, thus helping avoid accidents.Vaccum assitor hydraulic brakes are used as a Braking system.

## TYPES OF BRAKING SYSTEM :

### 1. DRUM BRAKE

A **drum brake** is a brake that uses friction caused by a set of shoes or pads that press outward against a rotating cylinder-shaped part called a brake drum as shown in fig 4.34

### 2. DISK BRAKE

A **disc brake** is a type of brake that uses the calipers to squeeze pairs of pads against a disc or a "rotor" to create friction as shown in fig 4.35

**Figure 4.34 Drum Brakes**

**Figure 4.35 Disc Brake**

In this section I performed work of cleaning the break pads, inspection of breakpad thickness and disks of break whether the surface is even or not. And in one of the as a team we have changed break disk of the car as we can see in fig 4.36 . Usually Disk brakes are installed in fron wheel beccause it can with stand the load of car hood.

**Figure 4.36 Installing of New disc**

If theres any uneven surface we can make even using skimming machine. Skimming Machine is used to Skimming machines are used worldwide in large steel factories as we can see in FIG 4.37. In order to ensure a smooth flow of processes in the steelworks, the skimming machines used must be extremely robust, durable, and of high quality. For years, Holtmann has been providing steelworks with high-quality machines for skimming the melt.


**Figure 4.37 Skimming machine**

## Automatic gear box

A transmission **changes gears** depending on car speed and accelerator input so that the engine's RPM or "revolutions per minute" are kept appropriately low. This provides two benefits: Fuel consumption is decreased. The turning gears do not overload the engine.

An **automatic transmission** is a multi-speed transmission used in motor vehicles that does not require any driver input to change forward gears under normal driving conditions. An automatic transmission gear box as shown in fig 4.38

**Figure 4.38 Automatic Gear Box**

## Manual Gear box

A transmission changes gears depending on car speed and accelerator input so that the engine's RPM or "revolutions per minute" are kept appropriately low. This provides two benefits: Fuel consumption is decreased. The turning gears do not overload the engine.

A manual transmission is a multi-speed motor vehicle transmission system, where gear changes require the driver to manually select the gears by operating a gear stick and clutch.

The problem we encountered here is changing the synchronizer. Synchronizer helps us to shift gears smoothly the disassembling of manual gearbox we can see in fig 4.39

**Figure 4.39 Manual Gear Box**

**Clutch**

A Clutch is a mechanical device that engages and disengages power transmission, especially from a drive shaft to a driven shaft as shown in fig 4.310. In the simplest application, clutches connect & disconnect two rotating shaft. The clutch plate is the driving member of the clutch and is gripped between the flywheel and the pressure plate. It is mounted on the clutch shaft through the splines. When it is gripped, rotates the clutch shaft and the power is transmitted from the engine to the transmission through the clutch.

**Figure 4.310** Pressure plate & Friction plate

The task we performed here is changing of fly wheel since it is used beyond limits. Firstly we changed the fly wheel which helps us to maintain a rotating mass (inertia) to assist the engine rotation and provide a more consistent delivery of torque during running. The second is to provide a ring gear for the starter motor to engage on. And we mounted it to the place where it belong as we can see in fig

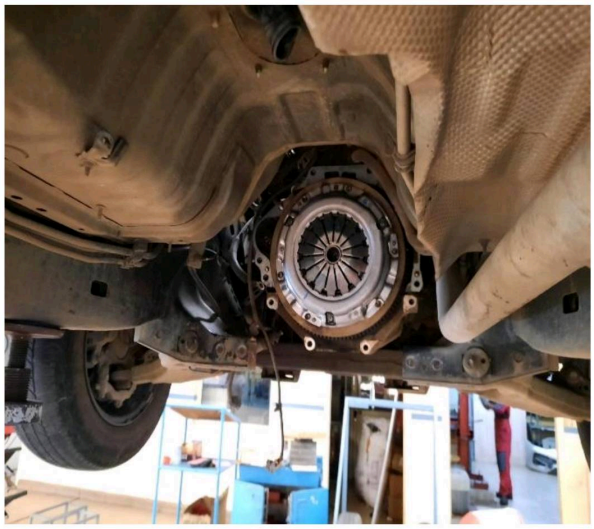


**Figure 4.311 Assembled of clutch plate where it belongs**

**Diesel tank**

A fuel tank (also called a petrol tank or gas tank) is a safe container for flammable fluids as shown in fig 4.311. Though any storage tank for fuel may be so called, the term is typically applied to part of an engine system in which the fuel is stored and propelled (fuel pump) or released (pressurized gas) into an engine. Fuel tanks range in size and complexity from the small plastic tank of a butane lighter to the multi-chambered

Proper design and construction of a fuel tank play a major role in the safety of the system of which the tank is a part. In most cases intact fuel tanks are very safe, as the tank is full of fuel vapour/air mixture that is well above the flammability limits, and thus cannot burn even if an ignition source were present (which is rare).

And in fuel tank there will be a sensor called level sensor that we can see in fig . The Submersible level sensor works by measuring the hydrostatic pressure emitted by a liquid in the tank. Since hydrostatic pressure is a measure of two variables, one being the density of the fluid and the other being the height of the fluid.

**Figure 4.312 Diesel Tank**

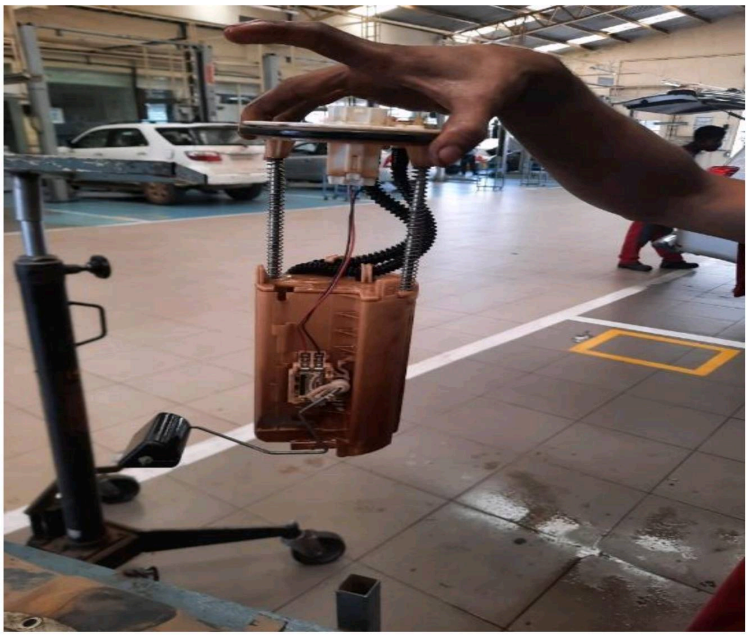


**Figure 4.313 Level sensor**

And the work performed here is changing the level sensor. Since its not working. The Submersible level sensor works by measuring the hydrostatic pressure emitted by a liquid in the tank. Since hydrostatic pressure is a measure of two variables, one being the density of the fluid and the other being the height of the fluid.

## WHEEL ALLIGNMENT

Wheel alignment is a part of standard automobile maintenance that consists of adjusting the angles of the wheels so that they are set to the car maker's specification.

If you detect any of the following, your car may require alignment:

1. The vehicle is drifting to one side of the road.
2. The treads on the tyres are wearing down too quickly or unevenly.
3. The tyres are making a squeaking noise.
4. When you're driving, the steering wheel tilts off-centre.
5. When you accelerate, the steering wheel vibrates.

In wheel alignment process they will check

- **Camber Angle**
- **Caster Angle**
- **Toe in & out**

### Camber Angle

Camber is the tilt of the car wheel from the vertical. The tyres life will be maximum when camber angle is zero.

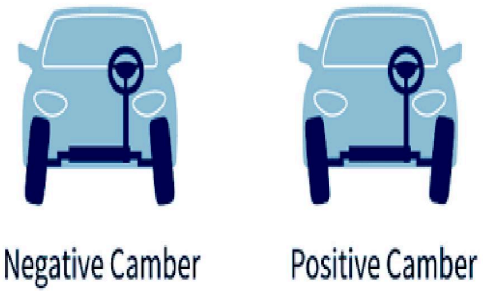



**Figure 4.314 Camber Angle settings**

POSITIVE CAMBER ANGLE

- It tilts outward it is positive camber angle.

NEGATIVE CAMBER ANGLE

- It tilts inward in negative camber angle.

### Caster angle

The angle between kingpin center line and vertical in the plane of the wheel is called the caster angle.

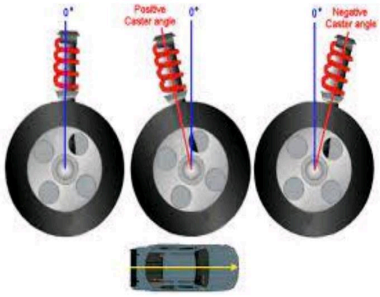



**Figure 4.315 Castor Angle settings**

POSITIVE CASTER ANGLE

- When the top of the king pin axis is inclined to the rear of the wheel.

NEGATIVE CASTER ANGLE

- If toping of the king pin axis is incline to the front of the vehicle.

**Toe IN & OUT**

- Toe-in is the amount by which the front wheels are set closer together at the front than at the rear when the vehicle is stationary.
- Wheel may be set closer at the rear at the front in wheel case the difference of the distance between the front wheel at the front and the rear is called toe-out.

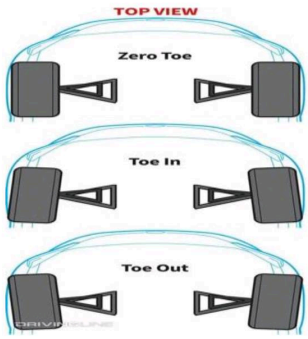



**Figure 4.316 Toe in & out settings**

**BENEFITS OF THE WHEEL ALIGNMENT**

- Reduce wear and tear.
- Better gas mileage due to less work on the engine.
- Improved safety.
- Shorter stopping distance.
- Safer driving.
- Save money and environment.
- Improve fuel consumption.

Chapter 5

# CONCLUSION

1. Internship at Nandi Toyota helped me in better understanding of how technical maintenance of the Toyota vehicles works and how effectively it is done, I enjoyed working with Nandi Toyota team to devise and implement servicing strategies.
2. I understood how an organization works under extreme pressure and how to handle it like when so many cars have to repair in the limited time which is it is really a very big task.
3. Now I am able to analyze & rectify Brakes related problem, suspension related problems, gears replacement and Wheel alignment.
4. Overall, it was a good experience and increased my interest in the Automobile engineering, now i am planning to enhance my skills in this field.